

RESEARCH ARTICLE

MEDIS (Mindfulness Meditation Combined with Tibetan Singing Bowls) for Dysmenorrhoea Among Adolescents: A Pre-experimental Study

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ABSTRACT

Introduction: Dysmenorrhoea is one of the most prevalent menstrual disorders among adolescents. Non-pharmacological approaches, including mindfulness meditation and sound-healing therapies, are increasingly being explored as complementary pain-management strategies. Tibetan singing bowl therapy may promote relaxation through sound vibration and meditative effects, potentially reducing tension, anxiety, and pain. Combining these modalities may provide complementary psychophysiological benefits. This study examined changes in dysmenorrhoea pain scores before and after mindfulness meditation combined with Tibetan singing bowls among adolescents at SMPN 3 Abiansema.

Methods: This pre-experimental study used a one-group pre-test-post-test design. Forty adolescent girls aged 10-14 years who experienced dysmenorrhoea were recruited by purposive sampling. The intervention was delivered three times per week for two weeks before menstruation, with each session lasting 15 minutes. Pain intensity was measured using the Numeric Rating Scale (NRS). Data were analysed using the Wilcoxon signed-rank test.

Results: Before the intervention, most participants experienced mild pain (67.5%), and the mean pain score was 2.57 ± 1.83 . After the intervention, 57.5% of participants experienced mild pain and 37.5% reported no pain; the mean pain score was 1.17 ± 1.31 . The Wilcoxon signed-rank test indicated a statistically significant reduction in dysmenorrhoea pain scores ($Z = -4.916$, $p < 0.001$).

Conclusion: MEDIS was associated with a statistically significant reduction in dysmenorrhoea pain scores. Pending confirmation in more rigorous studies, the intervention may offer an accessible complementary approach to dysmenorrhoea pain management in adolescents.

Keywords: Dysmenorrhoea; Mindfulness Meditation; Tibetan Singing Bowls; Adolescents; Complementary Therapy

INTRODUCTION

Menstruation is cyclical uterine bleeding experienced by most women of reproductive age. Menstrual disorders may involve the duration or regularity of the menstrual cycle or the volume of menstrual blood. Common disorders include dysmenorrhoea, premenstrual syndrome, amenorrhoea, hypermenorrhoea, polymenorrhoea, oligomenorrhoea, and hypomenorrhoea. An estimated 88% of adolescents experience dysmenorrhoea; 8.7% are unable to attend school, and 49% use analgesics (1).

Dysmenorrhoea is pain in the lower abdomen and pelvis that occurs during menstruation and may be associated with increased prostaglandin production or hormonal imbalance (2). Symptoms commonly include lower-abdominal cramps that begin shortly before or during menstruation, peak within 24 hours, and usually resolve within two days. Associated symptoms may include mood changes, fatigue, anxiety, irritability, sleep disturbance, headache, breast tenderness, bloating, back or joint pain, nausea, vomiting, diarrhoea, constipation, and acne (2). Dysmenorrhoea can disrupt adolescents' school activities (3). Reported effects include leaving class or returning home (43.33%), reduced concentration (53.33%), weakness during lessons (60%), and remaining silent in class (63.33%). Persistent disruption may adversely affect academic performance (4). In Indonesia, approximately 55% of women of reproductive age experience dysmenorrhoea, and 15% report activity limitations (5,6). Globally, the reported prevalence among women of reproductive age ranges from 34% in Egypt to 94% in Oman, while the proportion reporting very severe pain ranges from 0.9% in Korea to 59.8% in Bangladesh (6). Among adolescents in Surakarta, the reported prevalence was 87.7% (7). In Bali, the incidence reported in 2014 was 48.05% (8).

Dysmenorrhoea may be managed using pharmacological and non-pharmacological approaches. Non-pharmacological approaches, often described as complementary therapies, are increasingly studied as adjuncts or alternatives to conventional treatment (8). Reported complementary approaches include yoga, music therapy, breathing and relaxation exercises, warm compresses, acupuncture, aromatherapy, hypnosis, acupressure, and mind-healing techniques (9,10). The National Institutes of Health classifies complementary approaches into biological practices; mind-body techniques, including hypnosis and meditation; manipulative and body-based practices; energy therapies; and traditional medical systems, including traditional Chinese medicine and Ayurveda (10). Meditation is a mind-body practice that focuses and clears attention to promote calmness and comfort (10). Mindfulness meditation emphasises present-moment awareness and non-judgemental attention to bodily sensations, thoughts, and emotions. Mindfulness-based interventions may contribute to pain reduction, stress regulation, emotional stability, and psychological well-being by modulating autonomic nervous system activity and pain perception (11).

Singing bowl therapy has also been investigated for its potential to reduce tension, anxiety, and depressive symptoms (12). Tibetan singing bowls are increasingly explored as a sound-healing modality that may promote relaxation and reduce psychological distress through auditory vibration and meditative resonance (13). Meditation and Tibetan singing bowl interventions have been applied to psychological symptoms such as stress and depression, as well as symptoms related to the menstrual cycle. An observational study reported reductions in tension and negative affect following singing bowl sound meditation (12). Meditative relaxation may reduce sympathetic nervous system activity and increase parasympathetic activity. Tibetan singing bowls are used in meditative practices. Sound is produced by striking or rubbing the rim of a metal bowl with a mallet (12). Sound-based practices have been used in different cultures, and singing bowls are one such approach. Evidence regarding their effects on mental health and pain remains emerging (14,15).

Meditation has been associated with physiological and psychological benefits (16,17). Mindfulness meditation, in particular, has been investigated as an approach to chronic pain management (17). Combining meditation with sound-based practices may provide complementary effects; therefore, Tibetan singing bowls were integrated with mindfulness meditation in the present intervention.

Although mindfulness meditation and sound-healing interventions have individually shown potential benefits for pain and psychological symptoms, few studies have investigated their combined use for dysmenorrhoea management among adolescents. Their integration may promote relaxation, reduce perceived stress, and enhance parasympathetic activity. This study therefore aimed to examine changes in dysmenorrhoea pain scores before and after mindfulness meditation combined with Tibetan singing bowls among adolescents at SMPN 3 Abiansema.

METHODS

Study Design

This quantitative study used a pre-experimental, one-group pre-test-post-test design.

Forty adolescents aged 10-14 years were recruited by purposive sampling at SMPN 3 Abiansema. Data were collected from April to May 2025 using the Numeric Rating Scale and were analysed using the Wilcoxon signed-rank test to compare pain scores before and after the intervention.

Setting and Participants

The study was conducted at SMPN 3 Abiansema from April to May 2025. Forty adolescent girls aged 10-14 years who experienced dysmenorrhoea were recruited by purposive sampling.

The inclusion criteria were: (1) girls aged 10-14 years; (2) dysmenorrhoea during menstruation; (3) ability to communicate effectively; and (4) willingness to participate. Participants with known reproductive-organ abnormalities, diagnosed gynaecological disease, or current analgesic use during menstruation were excluded. Reproductive health conditions were screened through self-report and school health records.

Measurement Instrument

Dysmenorrhoea pain intensity was assessed using the Numeric Rating Scale (NRS), a validated self-report instrument on which participants rated pain from 0 (no pain) to 10 (worst imaginable pain). Pain was categorised as no pain (0), mild pain (1-3), moderate pain (4-6), or severe pain (7-10). The pre-test assessment was conducted at the onset of menstruation before the intervention. The post-test assessment was conducted on day 1 of the subsequent menstrual episode after completion of the intervention to reduce between-participant variation in assessment timing.

Data Collection and Intervention

Data were collected over two months, from April to May 2025. Participants were provided with a consent form and instructions for completing the questionnaire. They received mindfulness meditation combined with Tibetan singing bowls three times per week for two consecutive weeks before menstruation. Each session lasted approximately 15 minutes. The intervention included guided breathing awareness, relaxation exercises, and focused-attention meditation accompanied by Tibetan singing bowl sounds. Sessions were conducted in a quiet classroom under the guidance of trained facilitators. The facilitators had completed 200-hour yoga teacher training and Levels 1, 2, and 3 singing bowl therapy training. Procedural Steps of the MEDIS Intervention (Mindfulness Meditation with Tibetan Singing Bowls). The intervention followed a structured, sequential protocol. Each session began with instructions to close the eyes gently, followed by five slow, deliberate breathing cycles to promote physiological relaxation and attentional focus. Participants were then guided through a systematic body-scan mindfulness practice comprising: (1) auditory awareness, directing attention to surrounding sounds without judgement or labelling; (2) awareness of sensations around the eyes and any shapes, colours, or other visual phenomena perceived with the eyes closed, without judgement or labelling; (3) respiratory awareness, maintaining non-reactive attention to the natural flow of the breath through the nostrils; (4) olfactory awareness, acknowledging scents without judgement; (5) gustatory awareness, attending to sensations on the tongue without evaluating or labelling tastes; (6) somatosensory awareness, progressively scanning physical sensations from the crown of the head to the soles of the feet; and (7) cognitive and affective awareness, observing thoughts and emotions with open, non-judgemental, and non-reactive acceptance. Throughout the mindfulness instructions, participants attended to the resonant tones of a 22-cm-diameter brass-alloy Tibetan singing bowl, which was struck and rubbed with a leather-wrapped wooden mallet. Participants remained comfortably seated throughout each session. Attendance was recorded as an indicator of adherence, and all 40 participants completed the full intervention protocol.

Statistical Analysis

Descriptive statistics were used to summarise participant characteristics and pain scores. Normality was assessed using the Shapiro-Wilk test. Because the data were not normally distributed, the Wilcoxon signed-rank test was used to compare pre-test and post-test pain scores. Statistical significance was set at $p < 0.05$.

Ethical Considerations

Ethical approval was granted by the Health Research Ethics Commission of STIKES Bina Usada Bali (approval no. 077/EA/KEPK-BUB-2025).

RESULTS

Participant Characteristics

Table 1. Participant Characteristics

Characteristic	n	%	Mean ± SD
Age (years)			
10	2	5.0	
11	19	47.5	
12	13	32.5	
13	4	10.0	
14	2	5.0	
Total	40	100.0	11.62 ± 0.92
Family history of dysmenorrhoea			
Yes	23	57.5	
No	17	42.5	
Total	40	100.0	

Table 1 shows that most participants were aged 11 years (47.5%), and the mean age was 11.62 ± 0.92 years. More than half (57.5%) reported a family history of dysmenorrhoea.

Pain Severity Before and After the Intervention

Table 2. Dysmenorrhoea Severity Before the Intervention

Pain severity	n	%	Mean $\pm$ SD
Mild pain (NRS 1-3)	27	67.5	
Moderate pain (NRS 4-6)	12	30.0	
Severe pain (NRS 7-10)	1	2.5	
Total	40	100.0	2.575 $\pm$ 1.83

Before the intervention, 67.5% of participants experienced mild pain, 30.0% experienced moderate pain, and 2.5% experienced severe pain. The mean pain score was 2.575 $\pm$ 1.83 (Table 2).

Table 3. Dysmenorrhoea Severity After the Intervention

Pain severity	n	%	Mean $\pm$ SD
No pain (NRS 0)	15	37.5	
Mild pain (NRS 1-3)	23	57.5	
Moderate pain (NRS 4-6)	2	5.0	
Total	40	100.0	1.175 $\pm$ 1.31

After the intervention, 57.5% of participants experienced mild pain, 37.5% reported no pain, and 5.0% experienced moderate pain. No participants experienced severe pain. The mean pain score was 1.175 $\pm$ 1.31 (Table 3).

Normality Assessment

Table 4. Normality Test Results

Assessment	p-value
Pre-test	0.002
Post-test	<0.001

The pre-test and post-test distributions were non-normal (both $p < 0.05$); therefore, the Wilcoxon signed-rank test was used for the paired comparison (Table 4).

Comparison of Pre-test and Post-test Pain Scores

Table 5. Comparison of Dysmenorrhoea Pain Scores Before and After MEDIS

Outcome	Pre-test, mean $\pm$ SD	Post-test, mean $\pm$ SD	Z	p-value
Dysmenorrhoea pain score	2.575 $\pm$ 1.83	1.175 $\pm$ 1.31	-4.916	<0.001

The mean pain score decreased from 2.575 before the intervention to 1.175 after the intervention. The Wilcoxon signed-rank test indicated a statistically significant difference ($Z = -4.916$, $p < 0.001$; Table 5). Given the absence of a comparison group, this finding does not establish that the intervention caused the observed reduction.

DISCUSSION

Participant Characteristics

Most participants were aged 11 years (47.5%), which is within the typical age range for menarche among Indonesian adolescents. Dysmenorrhoea may become less prevalent with increasing age and menstrual experience because cervical dilatation increases and prostaglandin sensitivity may diminish (18). The predominance of younger participants may therefore reflect the vulnerability of early adolescents to menstrual pain.

More than half of the participants (57.5%) reported a family history of dysmenorrhoea. This finding is consistent with evidence of an association between family history and primary dysmenorrhoea, potentially related to inherited differences in prostaglandin sensitivity and hormonal regulation (19).

Pain Severity Before the Intervention

Before the intervention, 67.5% of participants experienced mild pain, 30.0% experienced moderate pain, and 2.5% experienced severe pain; the mean score was 2.575. A previous study also reported a high prevalence of dysmenorrhoea among females of different age groups (18). Dysmenorrhoea is lower-abdominal pain during menstruation and may be accompanied by symptoms such as nausea, vomiting, and headache. Reported internal factors include age at menarche, family history, menstrual duration, and exercise habits, while external factors include stress, nutritional status, and frequent consumption of fast food (20). Untreated dysmenorrhoea may disrupt adolescents' quality of life and school activities (3). Reported effects include leaving school early, reduced concentration, weakness, and withdrawal during class (3).

Pain Severity After the Intervention

After the intervention, 57.5% of participants experienced mild pain, 37.5% reported no pain, and 5.0% experienced moderate pain; no severe pain was reported, and the mean score was 1.175. This distribution suggests lower pain severity after the intervention, although the absence of a control group limits interpretation.

The authors identified no previous study that examined mindfulness meditation combined with Tibetan singing bowls for dysmenorrhoea among adolescent girls. Complementary approaches investigated for dysmenorrhoea include yoga, warm compresses, acupressure, lavender aromatherapy, herbal preparations, and relaxation techniques (3,21–23). Mindfulness meditation may reduce pain by modulating pain perception, reducing stress-related cortical arousal, and enhancing parasympathetic activity (24,25). It may also redirect attention from pain-related rumination towards non-judgemental awareness, thereby modifying the sensory and affective dimensions of pain (11). Meditative practice may support psychological, emotional, physical, and spiritual well-being (16).

Tibetan singing bowls produce sustained resonant tones when a metal or crystal bowl is struck or rubbed with a mallet. Singing bowl therapy has been associated with reduced negative affect, tension, and anxiety and with increased positive affect and well-being (13). Its vibroacoustic properties may influence psychoemotional states and promote a meditative state (26). A recent systematic review reported potential benefits for anxiety, depression, sleep, cognitive function, and autism-related behaviours, although the evidence base remains limited (27). Mindfulness meditation and sound therapy may share pathways involving parasympathetic activation, stress regulation, and pain modulation, providing a theoretical basis for their combined use.

Changes in Dysmenorrhoea Pain Scores After MEDIS

The Wilcoxon signed-rank test indicated a statistically significant reduction in dysmenorrhoea pain scores after the MEDIS intervention ($Z = -4.916$, $p < 0.001$), with a mean reduction of 1.40 NRS points. The direction of this change is consistent with mechanisms proposed in the literature on mindfulness-based analgesia and vibroacoustic therapy.

Meditation has been associated with physiological and psychological outcomes, including reduced symptoms of depression and anxiety, lower perceived stress and pain, and changes in heart rate, blood pressure, respiratory patterns, cortisol, and cerebral blood flow (13). These mechanisms could plausibly influence pain perception; however, none of these physiological variables was measured in the present study.

Combining meditation with Tibetan singing bowls may enhance relaxation. Singing bowl sound meditation has been associated with reductions in negative affect and increases in positive affect (13), while vibroacoustic stimulation may promote a more meditative state and feelings of balance and vitality (26). During singing bowl meditation, participants typically adopt a comfortable posture, focus on their breathing, and attend to the resonant tones (13). These processes may reduce stress and muscular tension, but the present study did not measure endorphins or other physiological mediators.

The findings are compatible with this theoretical framework, although biomarkers were not measured. The association between exposure to the intervention and lower pain scores should therefore be regarded as preliminary and should be tested in randomised controlled trials with appropriate comparison conditions.

Strengths, Limitations, and Recommendations

This study has several limitations. First, the one-group pre-test-post-test design lacked a control group, randomisation, and blinding, precluding causal inference. The reduction in pain scores may reflect placebo effects, participant expectations, menstrual-cycle variability, maturation, or regression to the mean, either instead of or in addition to an intervention effect. Second, the study was conducted at one school in Bali, limiting generalisability to other populations and sociocultural contexts. Third, purposive sampling may have introduced selection bias. Fourth, the sample size of 40 was not based on a formal power analysis. Fifth, primary and secondary dysmenorrhoea were not clinically differentiated; exclusion of secondary causes relied mainly on self-report and school health records rather than clinical examination. Sixth, potential confounders, including age at menarche, physical activity, nutritional status, and dietary habits, were not measured or controlled. Finally, participants were followed for only one post-intervention menstrual cycle, preventing conclusions about sustained effects.

Future studies should use randomised controlled designs with an active or wait-list control group, larger and more diverse samples, formal sample-size calculations, clinical confirmation of primary dysmenorrhoea, measurement of relevant physiological biomarkers, and longitudinal follow-up over multiple menstrual cycles. The intervention protocol should also be standardised, and fidelity should be formally monitored.

CONCLUSION

Dysmenorrhoea pain scores were significantly lower after MEDIS than before the intervention, decreasing from a mean of 2.575 to 1.175 ($Z = -4.916$, $p < 0.001$). The findings indicate an association between the combined intervention and lower pain scores among adolescent girls; however, the pre-experimental design does not support causal conclusions. Pending confirmation in more rigorous studies, MEDIS may be considered a complementary, non-pharmacological approach to dysmenorrhoea pain management in adolescents.

DECLARATIONS

Author contributions: I Gusti Agung Manik Karuniadi: Conceptualization, Methodology, Investigation, Formal analysis, Writing - original draft, Writing - review & editing. Luh Putu Widiastini: Methodology, Writing - review & editing. I Gusti Gede Mayun Surya Darma: Writing - review & editing.

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